Printed: June 1987
Tested at: Lethbridge
ISSN 0383-3445
Group 10a

Evaluation Report 526

CI Noble (Versatile) Model 5000 Blade Plow

A Co-operative Program Between

ALBERTA FARM MACHINERY RESEARCH CENTRE

PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

CI NOBLE (VERSATILE) MODEL 5000 BLADE PLOW

MANUFACTURER:

Vicon Western Canada
P.O. Box 3200
1000 - 6 Avenue N.E.
Portage la Prairie, Manitoba
R1N 3R3

DISTRIBUTOR:

Cereal Implements
P.O. Box 3200
1000 - 6 Ave. N.E.
Portage la Prairie, Manitoba
R1N 3R3

RETAIL PRICE: $31,273.00 (June, 1987, f.o.b. Lethbridge, Alberta). - seven section machine complete with spring loaded trip coulters and autotrip standards.

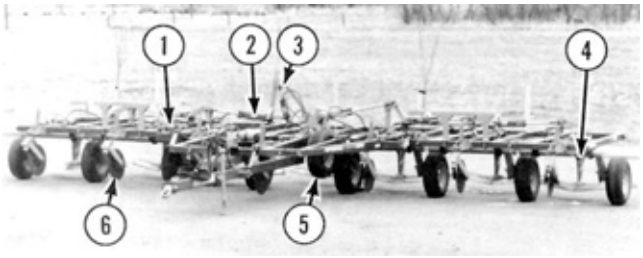

FIGURE 1. CI Noble (Versatile) Model 5000 Blade Plow: (1) Depth Control, (2) Wing Lift Cylinder, (3) Rear Hinge Stiffener, (4) Blade Standard, (5) Transport Wheel, (6) Coulter.

SUMMARY

Quality of Work: The CI Noble (Versatile) Model 5000 blade plow was equipped with autotrip three.way hydraulic standards. The trip forces on the standards could be varied by changing the hydraulic pressure of the trip cylinders. The standards, when tripped, were allowed to pivot from side to side or straight back. The standard would occasionally bind in the tripped position. Maximum lift height of the standards, when tripped directly back, was 6 in (152 mm) at the nose and 28 in (711 mm) out on the end of the wing. Maximum lift height when the blade was pivoted to one side was 3 in (76 mm) at the nose and 13 in (330 mm) out on the end of the wing.

Penetration was very good in all field conditions but performance could have been improved in dry fields and some stubble fields by the addition of weight tubes. Weight tubes were especially needed on the end wings. Penetration was uniform across the blade plow width, provided the unit was properly levelled. The Model 5000 was very good at following rolling field contours.

Trash clearance of the Model 5000 was excellent. Clearance between the tires and blades was large enough to prevent any plugging.

Some of the trash was buried in the furrows left by the standards of the blade. The field surface was left smooth when the blade was operated in normal field conditions. Skewing of the blade was not significant. Weed kill was very good.

Operation in stony conditions was very good. The autotrip system provided adequate protection.

Ease of Operation and Adjustment: Hitch weight was only 180 lb (80 kg) in the transport position so the rear mounted jack occasionally had to be used when hitching.

Transportation of the Model 5000 was Very good. The unit towed well at a transport speed of 20 mph (32 km/h). Transport width was 18.5 ft (5.6 m) and transport height was 12.3 ft (3.8 m).

Levelling the blades took considerable time and involved several adjustments. A separate instruction manual for levelling was provided. Front to back levelling of the unit was done by adjusting screwjacks on the hitch.

Depth adjustment required positioning the depth stop collars on three hydraulic cylinders. Caution had to be taken to move all the depth stop collars the same distance when changing depths.

One man could remove and replace the seven blades on the Model 5000 in about two hours.

Power Requirement: Tractor size depended on soil type, moisture content, ground speed and tillage depth. Overall tractor size needed to pull the Model 5000 at all tillage depths in all conditions was 235 power take-off hp (176 power take-off kW).

Operator Safety: The Model 5000 was safe to operate if normal safety precautions were observed. Transport locks were provided for the depth control cylinders and the transport wheel. Lock pins were provided for each wing.

Operator's Manual: The operator's manual was very good. A parts manual was also provided.

Mechanical History: The coulter hub nuts and collars had to be tightened throughout the test. A hydraulic hose rubbed on a tire and wore through.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Modifying the standard autotrip mechanism to ensure the standard resets after tripping.
2. Rerouting the hydraulic hoses to prevent them from rubbing on tires during field operation.

Station Manager: R. P. Atkins
Project Engineer: L. W. Papworth

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. The adjustable guide plates (item 7 in detail A of page 56 of the operator's manual) should be fairly snug against the tee section. If the gap between the guide plate and tee section is too great, the ball pin and socket will misalign when fully tripped to the side and the standard won't reset.
2. We will be providing hydraulic hose routing brackets on the next production run of the 5000 autotrip blade machines to prevent the hoses from coming in contact with the tires.

GENERAL DESCRIPTION

The CI Noble (Versatile) Model 5000 series blade is a trailing, flexible, blade plow suitable for primary and secondary tillage operations. It is available with 3, 5, 7 and 9 sections in widths varying from 15.5 ft (4.7 m) to 45.5 ft (13.9 m). The blade is available with rigid, shear-bolt or autotrip standards. The 5.5 ft (1.7 m) blades are available with bottom hardfacing, top hardfacing or plain in 100° or 75° angles. Tillage depth is set by hydraulic cylinders connected to the wheel axles.

Optional equipment available included weight tubes, rolling or spring loaded trip coulters, a rear mounted jack, suitcase weights, a spring hitch, a mounted or tag-a-long marker and chisel attachments.

The Model 5000 tested is 35.5 ft (10.8 m) wide with seven sections that fold up for transportation with three wings on the left side and two wings on the right side. The unit is equipped with optional equipment including spring loaded trip coulters, a rear mounted jack, suitcase weights and autotrip standards with shear bolts. The test machine came equipped with 100 degree blades and four sets of remote hydraulic controls.

SCOPE OF TEST

The CI Noble (Versatile) Model 5000 was operated in the field conditions shown in TABLE 1 for 140 hours while cultivating about 2590 ac (1036 ha). It was evaluated for quality of work, ease of operation and adjustment, power requirements, safety and suitability of the operator's manual.

TABLE 1. Operating Conditions.

FIELD CONDITION	HOURS	FIELD AREA ac	(ha)
SOIL TYPE			
- sand	8.5	160	(64)
- loam	106	1930	(772)
- clay	25.5	5oo	(200)
TOTAL	140	2590	(1036)
STONY PHASE			
- stone free	30.5	555	(2.22)
- occasional stones	57	1030	(412)
- moderately stony	49	940	(376)
- very stony	3.5	65	(26)
TOTAL	140	2590	(1036)

RESULTS AND DISCUSSION

QUALITY OF WORK

Shank Characteristics: The blade was equipped with autotrip three way hydraulic standards. Each standard was held in position by a single hydraulic cylinder. The cylinders were pressurized by the tractor hydraulics and held under pressure by two nitrogen charged accumulators (FIGURE 2) controlled by the autotrip manifold (FIGURE 3). The system pressure and preload pressure were shown on gauges. The pressure of the hydraulic cylinders could be adjusted from 0 to 1000 psi (6900 kPa) by using an allen wrench on the manifold. The system pressure was drained using the drain valve. This procedure was explained in the operator's manual.

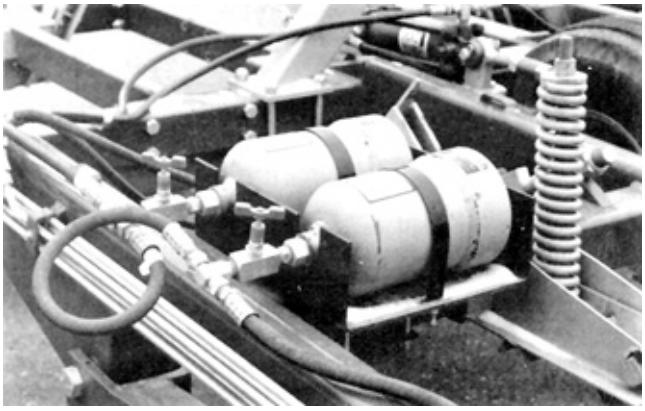

FIGURE 2. Nitrogen Charged Accumulators.

FIGURE 4 shows the forces required to trip the standards at different cylinder pressures. The recommended cylinder pressure used during the test was 500 psi (3450 kPa) which gave a trip force of 1900 lb (8455 N). The forces continued to rise as the standards tripped back so the hydraulic cylinders acted as cushion springs.

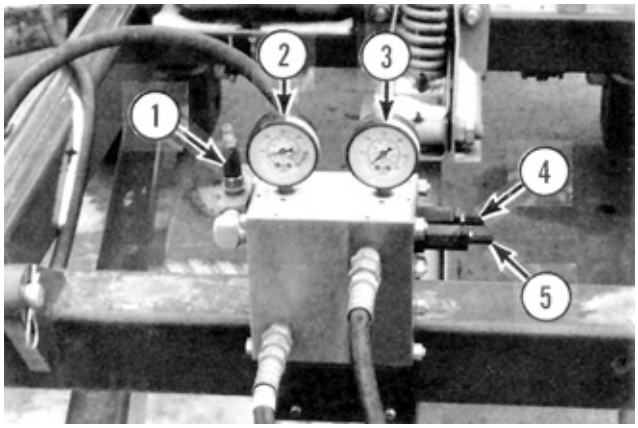

FIGURE 3. Autotrip Manifold: (1) Drain Valve, (2) System Pressure Gauge, (3) Preload Pressure Gauge, (4) Pressure Adjustment, (5) Relief Valve.

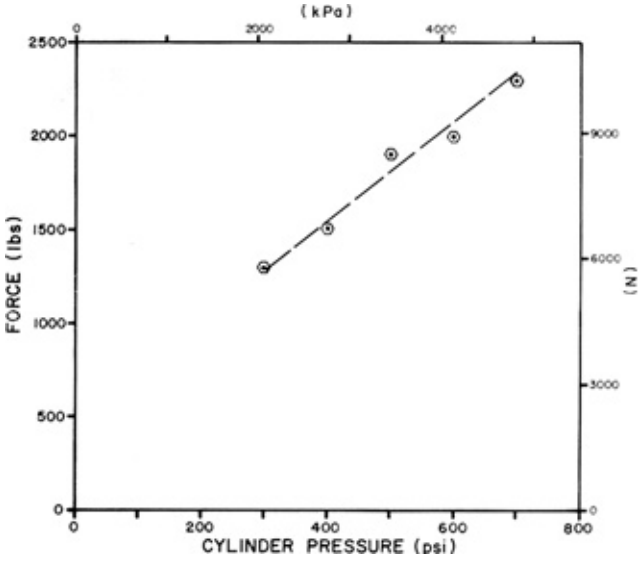

FIGURE 4. Standard Trip Forces at Various Cylinder Pressures.

FIGURE 5 shows the lifting pattern when a standard encounters stones or field obstructions such that the standard trips directly back. Maximum lift height of the standard, when tripped directly back, was 6 in (152 mm) at the nose and 28 in (711 mm) out on the end of the wing. The standards were also allowed to pivot from side to side, when tripped, as shown in FIGURE 6. Maximum lift height, when fully pivoted to one side, was 3 in (76 mm) at the nose and 13 in (330 mm) out on the end of the wing. The standard occasionally did not trip back into place when tripped by a large rock, because of the linkage binding as shown in FIGURE 7. The operator then had to relieve the pressure on the trip and pry the linkage loose. It is recommended that the manufacturer consider modifying the standard autotrip mechanism to ensure the standard resets after tripping.

The blades used during the test were plain with a 100 degree nose angle and a lift of 3.5 in (89 mm) (FIGURE 8).

Penetration: Penetration was very good in all field conditions but the performance could have been improved in dry fields and some stubble fields by the addition of weight tubes. Weight tubes were especially needed on the wings because they lacked enough weight for proper penetration and operation of the autotrip standards.

Worn blades made penetration more difficult when working deep in stubble fields. Worn blades were suitable for shallow work in summerfallow fields.

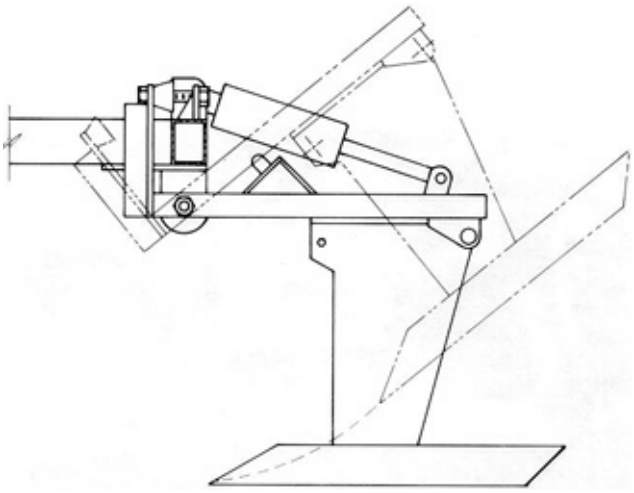

FIGURE 5. Blade Lifting Patterns.

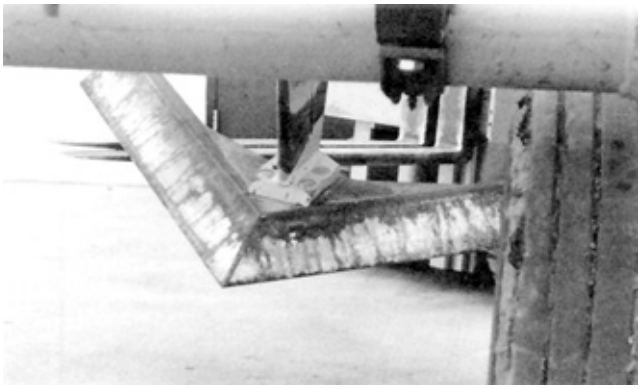

FIGURE 6. Side Tripping of Standard.

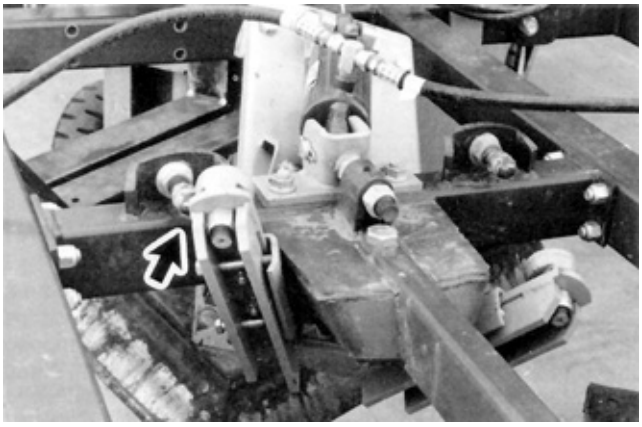

FIGURE 7. Binding Linkage with Side Tripping.

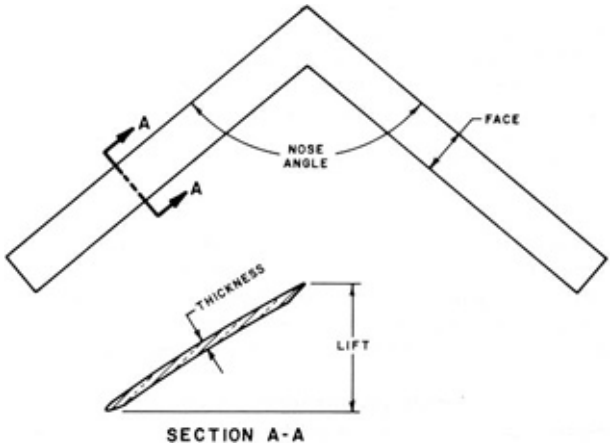

FIGURE 8. Blade Terminology.

The blade could be set to work at depths of six inches and shallower in firm soils. The standards started to occasionally trip back when operating at six inches deep in stubble fields with the cylinder pressure set at 500 psi (3450 kPa). The cylinder pressure should therefore be increased when operting the blade at greater depths.

Penetration was uniform across the blade plow width, provided the unit was properly levelled. Front to back levelling of the blade also was important for proper penetration. The manufacturer recommended to run the heel of the blades slightly deeper than the nose when penetration was a problem.

The blade followed rolling field contours very good, maintaining a uniform depth across its width. All sections were narrow enough to result in even penetration.

Flotation of the blade was very good in all field conditions but more even flotation could have been obtained with the use of weight tubes on certain sections of the blade. This would balance the weight supported by each wheel of the unit.

Trash Clearance: Trash clearance of the blade was excellent. A blade to frame clearance of 28 in (711 mm) and a 5 ft (1.5 m) standard spacing allowed large amounts of trash to clear. Clearance between the tires and blades was large enough to prevent any plugging.

Trash Burial and Field Surface: The blade left most of the trash on the surface of the field. FIGURE 9 shows the trash cover in a canola field before and after tillage. Some trash was buried in the furrows left by the shanks. The amount of trash buried in the furrows depended on the depth, speed of tillage and the soil conditions. The size of the furrow left by the standard was dependant on the depth and the speed of tillage. Moist soil would also build up on the shanks and weeds would wrap around the shanks causing an increase in the size of the furrow. The coulters did not always cut the weeds ahead of the standard in weedy conditions. The coulters tended to push the weeds down in soft soil conditions. The field surface was left smooth when the blade was operated in normal field conditions.

FIGURE 9. Trash Cover Before (Right) and After (Left) Tillage in Canola Stubble.

Skewing and Stability: The blade was very stable and did not skew sideways in normal field conditions. Slight skewing occurred on steep hills. Askewness did not cause weeds to be missed.

Weed Kill: Weed kill was very good. The shank spacing of 5 ft (1.5 m) resulted in a 6 in (152 mm) blade overlap. Blade wear did not cause weeds to be missed. Weed kill was occasionally inadequate in moist soil. Good weed kill occurred when the blades were run at the shallowest possible depth.

Stony Conditions: Operation in stony conditions was very good. The autotrip system provided adequate protection during the test. A nose was broken off a blade (FIGURE 10) during testing but no damage occurred to the standard. None of the shear bolts broke during the test. Maximum trip height of the coulters was 5 in (127 mm) and no damage occurred to them during the test.

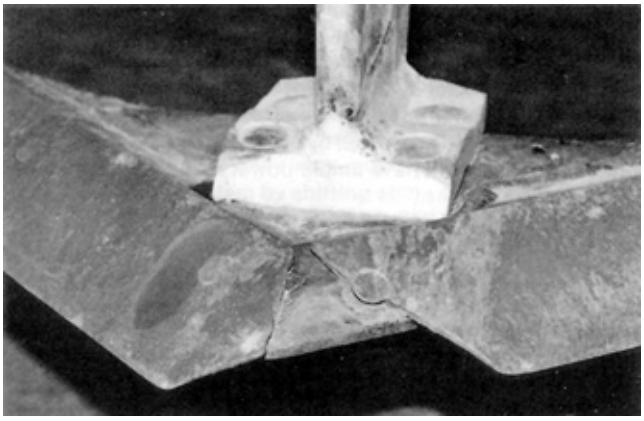

FIGURE 10. Nose Broken Off Blade.

EASE OF OPERATION AND ADJUSTMENT

Hitching: Ease of hitching to the blade was good. The hitch jack made one man hitching easy. Hitch weight was only 180 lb (80 kg) in the transport position so the rear jack mount was sometimes used when hitching.

Transporting: Ease of transporting the blade was very good. It took 5 to 10 minutes to place the unit in transport position (FIGURE 11). Transport locks on the cylinders were provided. They were easy to use but access to two of them required climbing on to the blade frame. Lock pins were provided for each wing with retaining holes for the pins in each hold up arm.

The blade required the use of a tractor with four sets of remote hydraulics. Two of these sets of hydraulics were used for transportation: one set for the wings and one set for the additional transport wheel and the rear hinge stiffener. The other two sets of hydraulics were used to pressure the autotrip system and to control the depth.

Transport width was 18.5 ft (5.6 m) while transport height was 12.3 ft (3.8 m). The unit towed well at a transport speed of 20 mph (32 km/h). Sweep to ground clearance during transport was 6 in (152 mm) but the center coulter hung lower. It sometimes had to be removed when the unit was transported. Transport wheel tread width was 10.5 ft (3.2 m) which made the unit stable during transport.

FIGURE 11. Transport Position.

Maneuverability: Maneuverability of the blade was very good. The hitch did not interfere with the rear wheels of the tractor while turning. Visibility of the last blade was good. The edge of the last blade was even with the edge of the tire so blading along fences was possible.

Frame Levelling: Ease of levelling the blade was fair. The procedure took considerable time and involved several adjustments. A useful instruction manual was provided which gave detailed instructions for levelling the 5000 series blade plows.

The autotrip blades were fore and aft levelled to the frame by moving the round ended socket pins (FIGURE 12). The pin mounts were slotted to adjust the side to side levelling. Shims were also used on the standard for side to side levelling if the socket pin slots did not have enough adjustment.

The blades were levelled to each other by adjusting the depth cylinder lugs (FIGURE 13), the tie-bolts on the axle of each wheel (FIGURE 14) and the axle linkage between each axle (FIGURE 15). The various measurements were given in the levelling instruction manual. Front to back levelling of the blade was done by adjusting the screw jacks on the hitch (FIGURE 16). Caution had to be taken not to tighten the two screw jacks against each other. Complete levelling of the blade took two people approximately three hours. Once initial levelling is completed only minor adjustments are required.

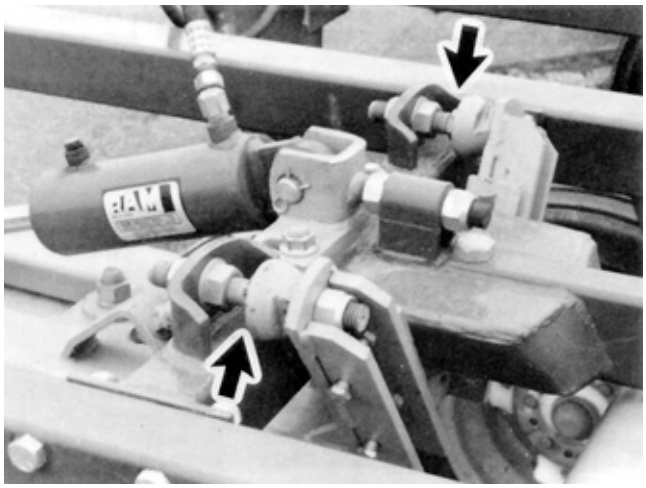

FIGURE 12. Adjustable Round Ended Socket Pins.

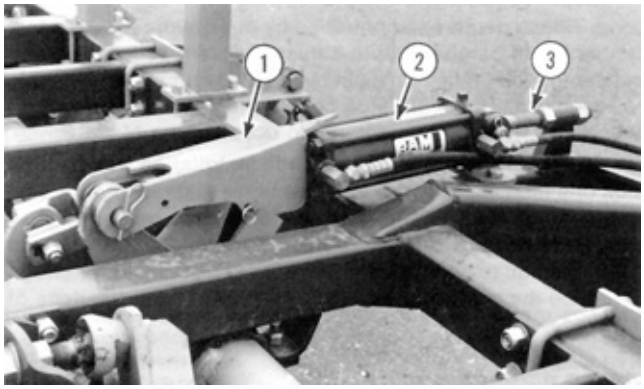

FIGURE 13. Depth Control Linkage: (1) Hold Up Bar, (2) Cylinder, (3) Adjustable Lug.

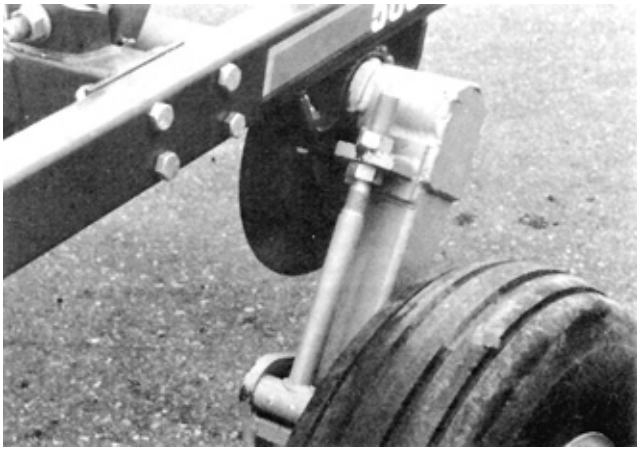

FIGURE 14. Adjustable Axle Tee-Bolts.

FIGURE 15. Axle Linkage.

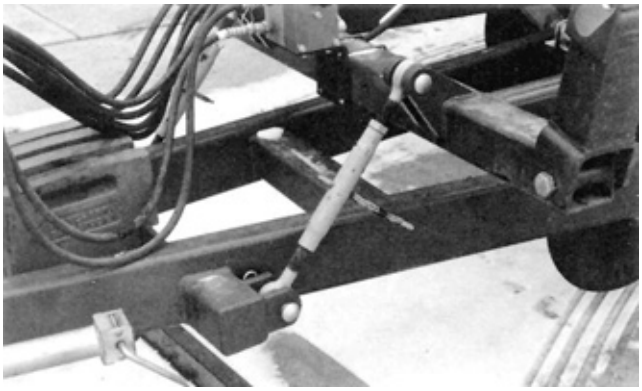

FIGURE 16. Hitch Screwjacks.

Depth Adjustment: Ease of setting the tillage depth was good. Tillage depth was controlled by three hydraulic cylinders connected in parallel. Depth adjustment required positioning the depth stop collars on each cylinder. Caution had to be taken to move all the depth stop collars the same distance when changing depths or damage could occur to the blade.

Blade Installation: Ease of blade installation was good. It took one man about two hours to remove and replace the seven blades on the blade. High frame clearance permitted easy movement underneath the unit. The bolts holding the blade to the frame had to be tightened from the nose back to the wings to reduce the chance of any stress on the weld at the nose of the blade.

POWER REQUIREMENTS

Draft Characteristics: Draft requirements for the same blade cultivator, in the same field, may vary significantly due to changes in soil conditions. Variation in soil conditions affect draft as much or more than variation in machine make, usually making it impossible to measure any significant draft differences between different makes of blade type cultivators.

In primary tillage, average draft at 5 mph (8 km/h), varied from 200 lb/ft (2.9 kN/m) at a 2.5 in (64 mm) depth to 329 lb/ft (4.8 kN/m) at a 5 in (127 mm) depth. For the 35.5 ft (10.8 m) wide blade, this corresponds to a total draft ranging from 7040 lb (31.3 kN) to 11,325 lb (50.4 kN).

In secondary tillage, average draft at 5 mph (8 km/h), varied from 110 lb/ft (1.6 kN/m) at a 2.5 in (64 mm) depth to 275 lb/ft (4.0 kN/m) at a 5 in (127 mm) depth. This corresponds to a total draft ranging from 3870 lb (17.2 kN) to 9650 lb (42.9 kN).

With the blade operating at a 3.5 in (89 mm) depth in primary conditions, the use of coulters at a 2.5 in (64 mm) depth increased the draft by 10%. Similar increases can be expected under other conditions.

Tractor Size: FIGURE 17 shows the horsepower requirements for blade type cultivators in typical primary and secondary tillage, at a speed of 5 mph (8 km/h). Overall tractor size needed to pull the blade, at all tillage depths, was 235 power take-off hp (176 kW). This tractor size has been adjusted to include tractive efficiency and represents a tractor operating at 80% of the maximum power take-off rating as determined by Nebraska tests or as presented by the tractor manufacturer. The tractor size given will have ample power reserve to operate in the stated conditions.

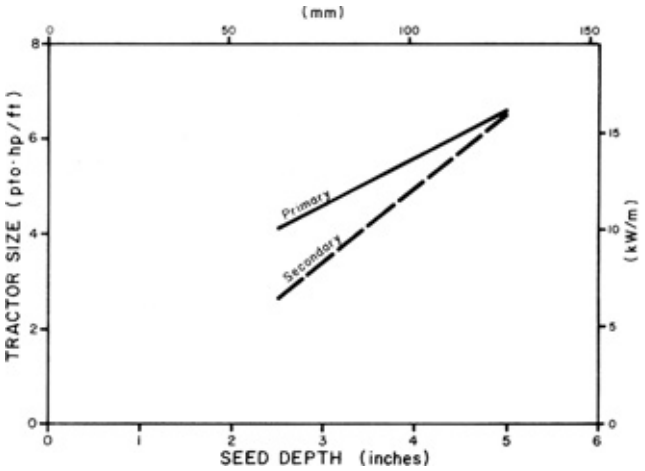

FIGURE 17. Average Horsepower Requirements for Blade Cultivators at 5 mph (8 km/h).

OPERATOR SAFETY

The Model 5000 was safe to operate if normal safety precautions were observed. The transport height of 12.3 ft (3.8 m) allowed for safe transportation of the unit but the transport width of 18.5 ft (4.6 m) necessitated caution when transporting. Transport locks were provided for the depth control cylinders and the transport wheel. Lock pins were provided for each wing. A slow moving vehicle sign was provided.

Tire loads did not exceed the maximum load ratings. The transport tires used on the blade were farm highway service nylon tires with load carrying capabilities depending on the speed. The tires allowed the unit to be safely transported up to speeds of 35 mph (56 km/h).

OPERATOR'S MANUAL

The operator's manual was very good. It contained information on safety, operation, lubrication, maintenance and assembly. A separate parts manual and levelling instructions booklet were also provided. The manuals were clearly written with photographs and illustrations for explanations.

MECHANICAL PROBLEMS

The blade was operated for 140 hours while cultivating about 2590 ac (1036 ha). The intent of the test was evaluation of functional performance and an extended durability evaluation was not conducted. TABLE 2 outlines the mechanical problems that did occur during the functional testing.

TABLE 2. Mechanical History.

ITEM	OPERATING HOURS	EQUIVALENT FIELD AREA ac	(ha)
- standard autotrip cylinder at	23	430	(172)
- tightened loose standard bolts at	35.5	625	(250)
- replaced hydraulic tee on center	52	880	(352)
- hydraulic hose between autotrip standards rubbed on tire and wore through at	132	2430	(972)
- retaining collars for coulters slid out of place	throughout the test		
- tightened nuts on coulter hubs	throughout the test		

DISCUSSION OF MECHANICAL PROBLEMS

Replacement of Hydraulic Tee: The hydraulic tee fitting on the center standard was damaged and replaced three times. The tee was damaged by the left hand end wheel tire which interfered with the tee when the unit was in transport position. There was little clearance between the tire and tee (FIGURE 18) so when the unit flexed, the tire would rub on the tee. The manufacturer solved the problem by shifting some of the hold up arms and by replacing the center wing lift link. These changes increased the clearance between the tire and tee significantly so the problem did not occur during the rest of the test.

Hydraulic Hose Failure: The hydraulic hoses running between the autotrip cylinders would occasionally rub on the tires during field operation. One hose wore through and failed. Tarp straps were put on the hoses (FIGURE 19) to prevent this from occurring again. It is recommended that the manufacturer consider rerouting the hydraulic hoses to prevent them from rubbing on tires during field operation.

Blade Wear: FIGURE 20 shows the wear on a typical blade at the end of the test. Each blade had tilled approximately 370 ac (148 ha) under conditions listed in TABLE 1. The blades were essentially worn out at this point.

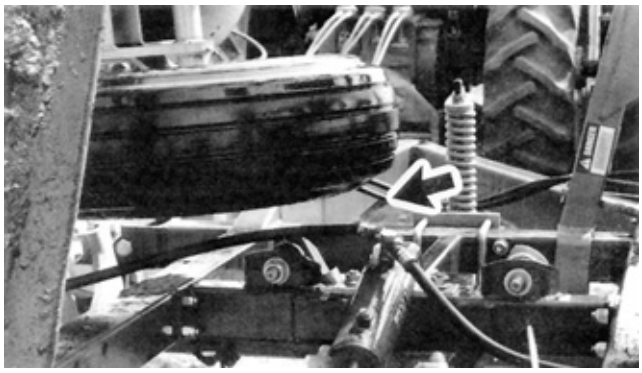

FIGURE 18. Small Clearance Between Tire and Hydraulic Tee at Start of Test.

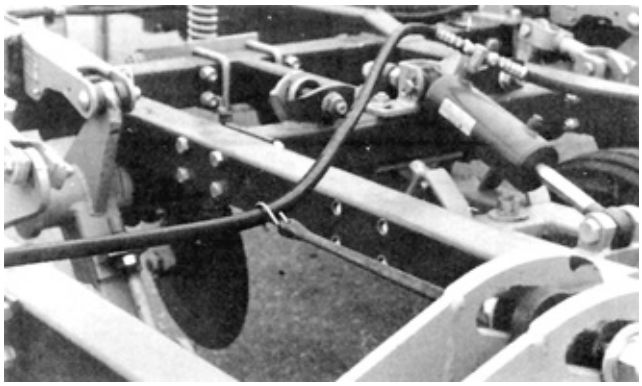

FIGURE 19. Tarp Strap Used to Keep Hydraulic Hose from Rubbing on Tire.

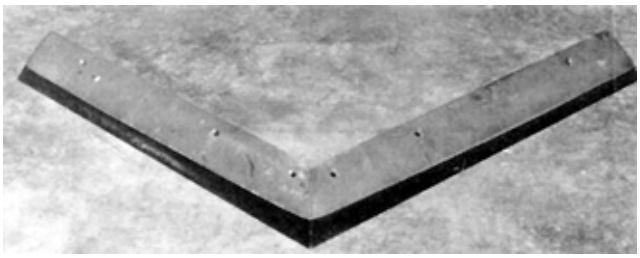

FIGURE 20. Wear on Typical Blade at End of Test.

APPENDIX I

SPECIFICATIONS

MAKE:	CI Noble (Versatile)	
MODEL:	5000	
SERIAL NUMBER:	269776	
MANUFACTURER:	Vicon Western Canada P.O. Box 3200 1000 - 6 Ave. N. E. Portage la Prairie, Manitoba R1N 3R3	
OVERALL DIMENSIONS:	**FIELD POSITION**	**TRANSPORT POSITION**
- width	18.5 ft (5.6 m)	
- length	21.5 ft (6.6 m)	21.5 ft (6.6 m)
- height	6.4 ft (2.0 m)	12.3 ft (3.8 m)
- maximum ground clearance	7.0 in (178 mm)	6.0 in (152 mm)
- wheel tread	34.8 ft (10.6 m)	10.4 ft (3.2 m)
SHANKS:		
- number	7	
- spacing	5 ft (1.5 m)	
- blade to frame clearance	28 in (711 mm)	
- number of standard rows	2	
- distance between rows	19 in (483 mm)	
- shank thickness	1.1 in (29 mm)	
BLADE:		
- number of mounting bolts	10	
- bolt size	0.5 x 1.5 in (12.7 x 38.1 mm)	
- blade wing width	5.5 ft (1.7 m)	
- blade angle	100°	
- blade face width	6.5 in (165 mm)	
DEPTH CONTROL:	hydraulic	
FRAME:		
- cross section	4 in (102 mm) square tubing	
TIRES:		
- centre section	4, 11 - 15 LT, 6 ply	
- wing sections	5, 9.5 L - 15, 6 ply	
NUMBER OF LUBRICATION POINTS:		
- grease fittings	27	
- wheel bearings	18	
HYDRAULIC CYLINDERS:		
- depth control	3, 3.5 x 8 in (89 x 203 mm)	
- wing lift	2, 3.5 x 16 in (89 x 406 mm); 2, 4 x 16 in (102 x 406 mm)	
- wing lift	1, 4 x 24 in (102 x 610 mm); 1, 3.5 x 8 in (89 x 203 mm)	
- transport wheel	1, 3 x 8 in (76 x 203 mm)	
- autotrip	7, 3.5 x 6 in (89 x 152 mm)	
WEIGHTS:	**FIELD POSITION**	**TRANSPORT POSITION**
- right outer wing wheel	650 lb (290 kg)	
- right extension wing wheel	1190 lb (535 kg)	
- right centre wing wheel	1540 lb (695 kg)	3380 lb (152 kg)
- right centre wheel	2340 lb (1055 kg)	3280 lb (1480 kg)
- left centre double wheel	2089 lb (935 kg)	4780 lb (2150 kg)
- left centre wing wheel	1440 lb (650 kg)	
- left extension wing wheel	1290 lb (580 kg)	
- left outer wing wheel	660 lb (295 kg)	
- hitch	430 lb (195 kg)	180 lb (80 kg)
TOTAL	11,620 lb (5230 kg)	11620 lb (5230 kg)
OPTIONS INCLUDED ON TEST MACHINE:	spring loaded trip coulters, rear mounted jack, suitcase weights, autotrip standards, 3 - 2 wing-up configuration, bolt-on type support standards	
OTHER AVAILABLE OPTIONS:	weight tubes, spring hitch, mounted or tag-a-long markers, rolling coulters, chisel attachments, shear-bolt standards, top or bottom hard faced blades, 3, 5 and 9 section units with various wing-up configurations	

APPENDIX II

MACHINE RATINGS

The following rating scale is used in PAMI Evaluation Reports:

Excellent
Very Good
Good
Fair
Poor
Unsatisfactory

APPENDIX III

CONVERSION TABLE

acres (ac) x 0.40	= hectares (ha)
miles/hour (mph) x 1.61	= kilometres/hour (km/h)
inches (in) x 25.4	= millimetres (mm)
feet (ft) x 0.305	= metres (m)
horsepower (hp) x 0.75	= kilowatts (kW)
pounds (lb) x 0.45	= kilograms (kg)
pounds force (lb) x 4.45	= newtons (N)
bushels (bu) x 36.4	= kilograms/hectare (kg/ha)
pounds/acre (lb/ac) x 1.12	= kilograms/hectare (kg/ha)
pounds/bushel (lb/bu) x 12.5	= kilograms/cubic meter (kg/m³)

SUMMARY CHART
CI NOBLE (VERSATILE) MODEL 5732
BLADE PLOW

RETAIL PRICE:	$31,273.00 (June, 1987, f.o.b. Lethbridge)
QUALITY OF WORK:	
Shank Characteristics	
- trip clearance	6 in (152 mm) at nose and 28 in (711 mm) at wing tip; when tripped straight back 3 in (76 mm) at nose and 13 in (330 mm) at wing tip; when tripped to side
- trip force	adjustable; 1900 lb (8455 N) at 500 psi (3450 kPa)
Penetration	
- ability	**very good;** could be improved by weights
- uniformity	**very good;** followed rolling field contours
Trash Clearance	**excellent;** cleared large amounts of trash
Trash Burial and Field Surface	left most trash on surface
Skewing and Stability	very stable
Weed kill	**very good;** 5 in (127 mm) blade overlap
Stony Conditions	**very good;** no damage to standards
EASE OF OPERATION AND ADJUSTMENT:	
Hitching	**good**
Transporting	**very good;** transport width 18.5 ft (5.6 m) transport height 12.3 ft (3.8 m)
Maneuverability	**very good;** tractor tires did not rub hitch
Frame Levelling	**fair;** complicated
Depth Adjustment	**good;** adjust stops on three cylinders
Blade installation	**good;** two hours to change blades
POWER REQUIREMENTS:	235 PTO hp (176 kw) sufficient for all depths and conditions
OPERATOR SAFETY:	safe; slow moving vehcile sign supplied, cylinder transport locks and lock pins provided
OPERATOR'S MANUAL:	**very good;** clearly written
MECHANICAL HISTORY:	coulter hub nuts and collars had to be tightened throughout test, hydraulic hose rubbed on tire and wore through.

ALBERTA FARM MACHINERY RESEARCH CENTRE
3000 College Drive South
Lethbridge, Alberta, Canada T1K 1L6
Telephone: (403) 329-1212
FAX: (403) 329-5562
http://www.agric.gov.ab.ca/navigation/engineering/afmrc/index.html

Prairie Agricultural Machinery Institute
Head Office: P.O. Box 1900, Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-2555

Test Stations:
P.O. Box 1060
Portage la Prairie, Manitoba, Canada R1N 3C5
Telephone: (204) 239-5445
Fax: (204) 239-7124

P.O. Box 1150
Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-5033
Fax: (306) 682-5080